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Atherosclerotic plaque and hydroxyapatite nanostructures studied by high-frequency EPR

Gafurov M., Yavkin B., Biktagirov T., Mamin G., Orlinskii S., Izotov V., Salakhov M., Klimashina E., Putlayev V., Abdul'yanov V., Ignatjev I., Khairullin R., Zamochkin A., Chelyshev Y.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

A series of nanosized (20 nm and larger) samples of hydroxyapatite powders synthesized by wet preparation method and doped with Mn2+ and Pb2+ ions were studied by 94 GHz pulsed electron paramagnetic resonance (EPR). The results are compared with those obtained in the samples of aorta walls from male patients with atherosclerosis as well as in bulk hydroxyapatite materials. It is shown that in contrast to bulk materials Pb ions at least partially replace the Ca(1) site in the hydroxyapatite structure. The spectral characteristics of the Mn2+ ions revealed in atherosclerotic plaque and synthetic hydroxyapatite are found to be practically identical. The hypothesis about the important role of (nano)hydroxyapatite in formation and rupture of atherosclerotic plaques is supported.

Keywords

Atherosclerotic plaque, ENDOR, EPR, Hydroxyapatite, Nanomaterials